AQUATIC NUISANCE SPECIES ACTION PLAN

Black Hills National Forest

Three Year Actions
For the Prevention and Management of Aquatic Nuisance Species

FY 2014 – 2016

Rocky Mountain Region
USDA Forest Service

Signed: ***/s/ Dennis L. Jaeger (for):*** Date: ***May 5, 2014***
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Introduction:

This action plan is designed to serve as a strategic tool for implementation of the aquatic nuisance species (ANS) management program on the Black Hills National Forest (BKF). This plan becomes a part of the Forest's Invasive Species Action Plan. This ANS plan should be reviewed and adjusted as necessary each year to reflect emerging needs, shifting priorities, or changes in available funding.

1) Overview of Current Forest ANS Program and Expected Changes:

The overall strategy is to work closely with the State Resource Agencies and other partners to provide a well coordinated effort for the prevention, early detection and control of ANS, in a cost-effective manner. The primary goal is to prevent the introduction of additional ANS and to limit the secondary spread of existing ANS on the BKF. Several isolated populations of ANS currently exist on the Forest. The potential for new ANS introductions is an ongoing threat. The primary vectors and pathways to address are people and their recreational equipment as well as equipment used in Forest Service specific activities, such as fire suppression, aquatic habitat enhancement or inventory/monitoring.

2) Priority Species and Populations on the Black Hills NF

The species listed below are priority invasive species, based on the following criteria:

i) Potential to disrupt the aquatic ecosystem, degrade aquatic habitat, impact municipal water supplies, or reduce recreational opportunities.
ii) Potential for introduction or spread is high.
iii) Control is feasible.

Potential ANS were determined from a variety of sources. South Dakota Administrative Rule 41:10:04:01 identifies 19 ANS (10 fish, 4 plants and 5 invertebrates). The Forest Service Rocky Mountain Region ANS strategy also identified ANS risks pertinent to the Black Hills. Species identified as aquatic invasive species by the Wyoming Game and Fish Department were also considered. The following table presents ANS of concern on the BKF, but the list may not be all inclusive. ANS identified in the table below that are not currently present are considered a threat because the vector or pathway exists for introduction into the Black Hills.

Species and Location	Priority (#)	Total Occurrences (miles, acres, #)	Past Treatment, Inventory or Monitoring	Expected Impacts
Didymo (*Didymosphenia geminata*); Rapid & Castle Creeks	high	21 miles	SDGFP & SD DENR monitoring; SDSU/SDSM&T research projects	Degradation of stream habitat & fisheries; Reduced aesthetics

Species and Location	Priority (#)	Total Occurrences (miles, acres, #)	Past Treatment, Inventory or Monitoring	Expected Impacts
Zebra and Quagga Mussels (*Dreissena* spp.)	high	none	Limited inventory (Stephen 2008); Monitoring by SDGFP and USBR is ongoing.	Disruption of native food web; Fouling of water control infrastructure.
Chytrid Fungus (*Batrachochytrium dendrobatidis*; Bd)	medium	11 sites	Provided swab samples to Univ of SD in 2009 & 2010; Additional inventory in 2013.	Possible agent in the global decline/extinction of amphibian populations
Curlyleaf Pondweed (*Potamogeton crispus*); Sheridan Lake (FS); Angustora (USBR)	medium	Sheridan = 380 acres Angostura = 4,407 acres	3 acres of annual treatment at swim beaches at Sheridan Lake	Competes with native vegetation; dense mats impact recreation uses.
Red-rimmed Melania (*Melanoides tuberculata*); Cascade Springs & Fall River	medium	2 sites; Fall River = off-Forest	SDGFP/FS monitoring on Aug 2009 & June 2011. Stephen (2008)	Pet-trade snail that competes with and displaces native aquatic snails.
Ranavirus (virus family Iridoviridae)	medium	none		kills amphibians, reptiles & fish thru cell damage/lesions
Eurasian watermilfoil (*Myriophyllum spicatum*)	medium	none		Competes with native vegetation; dense mats impact recreation uses.
Brittle Naiad (*Najas minor*)	medium	none		Competes with native vegetation; dense mats impact recreation uses.
New Zealand Mud Snail (*Potamopyrgus antipodarum*)	medium	none	Limited inventory (Stephen 2008)	Disruption of native food web and alteration of aquatic habitat.

Species and Location	Priority (#)	Total Occurrences (miles, acres, #)	Past Treatment, Inventory or Monitoring	Expected Impacts
Viral Hemorraghic Septicemia (VHS)	medium	none	SDGFP monitoring at Belle Fourche Reservoir (2007-08)	Causes fish abnormalities & death
Whirling Disease (*Myxobolus cerebralis*)	medium	none		Causes deformities/death in trout
Rusty Crayfish (*Orconectes rusticus*)	medium	none		Displace native crayfish; reduce aquatic vegetation and diversity
Asian clam (Corbicula fluminea**)**	medium	none		Disruption of native food web and alteration of aquatic habitat.
Common Carp and Asian Carps (black, grass, silver and bighead)	medium	none, common carp occur off-Forest	SDGFP occurrence monitoring	Competition with and displacement of native species.
European Rudd (*Scardinius erythrophthalmus*); Pactola and Sheridan Reservoirs	low	1,230 acres	SDGFP occurrence monitoring	Competes with other desirable fish species.
Snakehead (*Channa* spp.)	low	none		Competition with and displacement of native species.

3) **Management area maps for each priority species**.

See Figures 1, 2 and 3 after the references.

4) **Priority treatment areas 2014-16**

The table below identifies priority projects that address prevention, early detection and rapid response (EDRR), control and management measures, or restoration efforts. Many of these Forest Service activities are administrative in nature, which reflects the continuing development of the ANS management program on the Forest.

FY	Location	Action	Target*	Partner, Cooperator, Permittee, Stakeholder, or Functional Area
2014	Rapid Creek	Didymo ongoing evaluation	21 miles	SD DENR, SDGFP & SDSU, SDSM&T
	Castle Crk	Didymo ongoing evaluation	< 1 mile	SDGFP, SDDENR
	Sheridan Lake	Curlyleaf pondweed control	6 acres	Mystic Ranger District, Concessionaire (FRM), Pennington County
	Sheridan, Pactola, Deerfield Reservoirs	Zebra/Quagga Mussel Early Detection Monitoring	3 reservoirs	SDGFP, US Bureau of Reclamation
	BKF	Outreach & Education	Meetings/presentations	Interested partners, District staff
	Cascade Springs	Monitor for red-rimmed melania	< 1 acre	SDGFP, Hell Canyon District
	BKF	Inspect ANS signage at recreation sites prior to May 15	≈7 sites; ≈13 access points	All Ranger Districts
	TOTAL			
2015	Forestwide	Chytrid fungus inventory	All Districts adequately surveyed	SDGFP & WGFD
	Rapid Creek	Didymo ongoing evaluation	21 miles	SD DENR, SDGFP & SDSU, SDSM&T
	Castle Crk	Didymo ongoing evaluation	< 1 mile	SDGFP
	Sheridan Lake	Curlyleaf pondweed control	6 acres	Mystic Ranger District
	Cascade Springs	Monitor for red-rimmed melania	< 1 acre	Hell Canyon RD
	BKF	Inspect ANS signage at recreation sites	≈7 sites; ≈13 access points	Forestwide
	BKF	Outreach & Education	Meetings/presentations	All interested partners
	TOTAL			
2016	Rapid Creek	Didymo ongoing evaluation; potential restoration	21 miles	SD DENR, SDGFP & SD State University
	Castle Crk	Didymo ongoing evaluation	< 1 mile	SDGFP
	Sheridan Lake	Curlyleaf pondweed control	6 acres	Mystic Ranger District
	BKF	Outreach & Education	Meetings/presentations	All interested partners

FY	Location	Action	Target*	Partner, Cooperator, Permittee, Stakeholder, or Functional Area
	Cascade Springs	Monitor for red-rimmed melania	< 1 acre	SDGFP, Hell Canyon District
	BKF	Inspect ANS signage at recreation sites	≈7 sites; ≈13 access points	Forestwide
	TOTAL			

* Treatment and restoration of streams and lakes are identified under NFWF as a legitimate target accomplishment (see FY14 budget narrative).

5) Lake and Stream Corridor Invasive Species Monitoring Schedule

The Black Hills provide a variety of water-related recreational opportunities along streams and at reservoirs. These opportunities are enjoyed by both the local population as well as the visiting public. These activities provide vectors and pathways for ANS introduction and spread. Forest Service activities also have the potential to introduce or spread ANS.

The SDGFP surveyed Black Hills streams for other occurrences of Didymo in June 2005. Twelve sites were surveyed where angler use is high, but no additional Didymo occurrences were found. In 2006, SD DENR reported Didymo on lower Castle Creek near Mystic (Larson pers. comm. 2006, SDGFP 2006).

Snail surveys funded by SDGFP in 2001 reported red-rimmed melania in Cascade Creek. Freshwater snail surveys, funded by SDGFP, occurred at nine sites in the Black Hills in 2008, including Cascade Springs (Stephen 2009). No non-indigenous species were discovered. The absence of red-rimmed melania in the 2008 survey may be explained by a difference in sampling locations. A snail survey on June 7, 2011 found live specimens of red-rimmed melania at Cascade Springs near the spring source.

Chytrid fungus was reported on the Black Hills in 2010 (Kerby 2011) at Lakota Lake, Slate Dam, Road 305 wetland and McVey Wildlife (Newton Fork) Pond. Surveys in 2009 did not detect the fungus. This may be explained due to the 2009 sampling being performed later in the summer when average temperatures were above the critical temperature for chytrid growth and therefore the reason for a lack of chytrid infection (Kerby 2011). Additional sampling and analysis for chytrid fungus was done in 2013. Additional occurrences were found (see Map 1 & 2).

Monitoring of Black Hills waterbodies should continue on a cyclical schedule to promote the early detection of ANS and a rapid response.

FY	Location	Target Species
2014	Rapid Creek Castle Creek (Mystic Trailhead) Cascade Creek Black Hills Reservoirs	Didymo Didymo Red-rimmed Melania ANS snails & plants
2015	Forestwide Rapid Creek	Chytrid Fungus Didymo

	Castle Creek Black Hills Reservoirs Cascade Creek	Didymo ANS snails & plants Red-rimmed Melania
2016	Rapid Creek Castle Creek Black Hills Reservoirs Cascade Creek	Didymo Didymo ANS snails & plants Red-rimmed melania

6) Coordinated Management Activity

The following table identifies external partners or other stakeholders that are important in the management of ANS on the BKF. Entities may be added and contacts may change over time.

Partner/Stakeholder	Contact Name	Location	Phone Number
SD Game, Fish & Parks	Mike Smith	Pierre, SD	(605) 223-7706
SD DENR	Robert Smith	Rapid City, SD	(605) 394-6653
WY Game & Fish Department	Beth Bear	Cheyenne, WY	(307) 777-4600
Nat'l Forest Advisory Board	Chairman Scherrer		
U.S. Bureau of Reclamation	Cindy Larom	Rapid City, SD	(605) 394-9757
U.S. Fish & Wildlife Service	Dr. Dan James	Pierre, SD	(605) 224-8693
SD State University	Dr. Katie Bertrand	Brookings, SD	(605) 690-8582
SD School of Mines & Tech.	Dr. Lisa Kunza	Rapid City, SD	(605) 394-2449
Black Hills Flyfishers	Hans Stephenson	Rapid City, SD	(605) 341-2450
Forest Recreation Management	Ty Gerbracht	Hill City, SD	(605) 574-4402
SD Invasive Spp. Mgt. Assoc.	Scott Guffey	Rapid City, SD	(605) 394-5320
Other Stakeholders	TBD		

The Black Hills National Forest is involved with ANS issues; however, the primary management response has been undertaken by State resource agencies, such as the South Dakota Department of Game, Fish and Parks (SDGFP), the South Dakota Department of Environment and Natural Resources (SD DENR) and the Wyoming Game and Fish Department (WGFD). Periodic updates are provided to the National Forest Advisory Board (NFAB) to maintain and increase awareness of ANS issues. NFAB has an Invasive Species subcommittee that has dealt primarily with noxious weed issues, but ANS issues could logically be within the scope of this subcommittee. Increased coordination with the U.S. Bureau of Reclamation (USBR) will continue to occur related to ANS and the operation of Deerfield and Pactola reservoirs (on-Forest) and Angostura and Belle Fourche reservoirs (off-Forest).

A number of ANS-related research projects have recently been completed on the Black Hills (James 2011, James 2013a, James 2013b, James et al. 2014). Beginning in March 2014, Dr. Lisa Kunza from the South Dakota School of Mines & Technology has several graduate projects underway to study didymo in Rapid Creek.

FY	Coordination Activity	Responsibility
2014	ANS Prevention	BKF and other stakeholders
	ANS Inventory (Streams & Reservoirs)	SDGFP, SD DENR, BKF, USBR

	ANS Awareness Outreach	BKF and other partners
2015	ANS Prevention	BKF and other stakeholders
	ANS Inventory (Streams & Reservoirs)	SDGFP, SD DENR, BKF, USBR
	ANS Awareness Outreach	BKF and other partners
2016	ANS Prevention	BKF and other stakeholders
	ANS Inventory (Streams & Reservoirs)	SDGFP, SD DENR, BKF, USBR
	ANS Awareness Outreach	BKF and other partners

7) Organizational Capacity

The Forest has identified an ANS Coordinator (see table below) in reply to a July 3, 2008 Regional Office request. These duties are primarily funded under the Wildlife, Fish and Rare Plants Program in the Supervisor's Office. Increased involvement with the Recreation Program both at the Forest and District level has been beneficial for on-the-ground implementation of this ANS strategy.

Staff	Responsibilities	Skills/Training Needed (By Year)
Craig Bobzien (Forest Supervisor)	Forestwide leadership, implementation & prioritization	Ongoing situational awareness
District Rangers	District leadership, implementation & prioritization	Ongoing situational awareness
Dave Mertz (Natural Resources Staff Officer)	Forestwide leadership, implementation & prioritization	Ongoing situational awareness
Kerry Burns (Forest Biologist)	Initial prioritization of NFWF funds	Ongoing situational awareness
Steve Hirtzel (Fisheries Biologist)	Forest ANS Coordinator	SD Watercraft Inspection Training (completed May 2009)
Recreation Program Leader (Scott Haas)	Coordination with Concessionaires, Special Use Permittees & Others	Ongoing situational awareness
District Program Staff and Specialists	Technical support	ANS identification and disinfection protocols

8) Funding

Implementation of the Forest ANS strategy will largely be funded through the Wildlife, Fish and Rare Plants (NFWF), Recreation (NFRW), Vegetation and Watershed Management (NFVW) or the Inventory and Monitoring (NFIM) programs. Funding through other programs, such as Cooperative Work (CWFS01) may also be available on a limited basis.

Implementation of the South Dakota (SDGFP 2008) and Wyoming (WGFD 2010) ANS Plans are likely to result in additional partnership opportunities and funding that has not been specifically identified to date.

FY	NFWF/NFVW NFRW/NFIM	CWFS01	Grants	Partnership	TOTAL
2014	$5,000	$1,500	-	TBD	$ 6,500
2015	$15,000	$1,500	-	TBD	$16,500
2016	$6,000	$1,500	-	TBD	$ 7,500

FY	Prevention	EDRR	Control	Restoration	TOTAL
2013	$2,500	$ 2,500	$1,500	-	$ 6,500
2014	$2,500	$12,500	$1,500	-	$16,500
2015	$3,000	$ 3,000	$1,500	-	$ 7,500

References

James, Daniel A. 2011. The influence of *Didymosphenia geminata* on fisheries resources in the Black Hills of South Dakota. Available online: http://pubstorage.sdstate.edu/wfs/thesis/James%20Daniel%20A%202011%20PHD.pdf

James, Daniel A. 2013a. Risk Potential for of the Aquatic Invasive Species *Didymosphenia geminata* to Bloom in Selected Streams of the Black Hills, South Dakota. 22 pp. http://www.fws.gov/greatplainsfishandwildlife/documents/Didymospheniageminatariskassessment2012report.pdf

James, Daniel A. 2013b. A survey for the aquatic invasive species New Zealand mudsnail *Potamopyrgus antipodarum* in the Black Hills of South Dakota. 15 pp. http://www.fws.gov/greatplainsfishandwildlife/documents/NewZealandmudsnailsurvey2012report.pdf

James, Daniel A., Kyle Mosel, and Steven R. Chipps. 2014. The influence of light, stream gradient, and iron on *Didymosphenia geminata* bloom development in the Black Hills, South Dakota. http://download.springer.com/static/pdf/54/art%253A10.1007%252Fs10750-013-1654-y.pdf?auth66=1397842948_2c290446d1194fe8f5260081593ed474&ext=.pdf

Kerby, J. 2011. Prevalence of an Emerging Disease in South Dakota Amphibian Populations. South Dakota Department of Game, Fish and Parks, Wildlife Diversity Grant – Final Report.

Larson, Aaron. 2006. June 21, 2006 e-mail RE: Didy found in Castle Creek near Mystic.

SDGFP. 2006. Troublesome diatom spreads in Black Hills streams. Game, Fish and Parks news releases for July 14, 2006.

SDGFP. 2008. South Dakota Aquatic Nuisance Species Management Plan. Available online: http://gfp.sd.gov/wildlife/nuisance/aquatic/SDANS-management-plan.aspx

Shearer, Jeff. 2005. E-mail dated May 8, 2006, RE: Didymo inventory results from last year.

Stephen, Bruce. J. 2009. Freshwater snails of South Dakota within the Middle Rockies, Western Corn Belt Plains, Northern Glaciated Plains and Lake Agassiz Plains Ecoregions.

WGFD. 2010. Wyoming Aquatic Nuisance Species Management Plan. Available online: http://wgfd.wyo.gov/web2011/Departments/Fishing/pdfs/WY_AIS_MANAGEMENT_PLAN0000165.pdf

MAPS

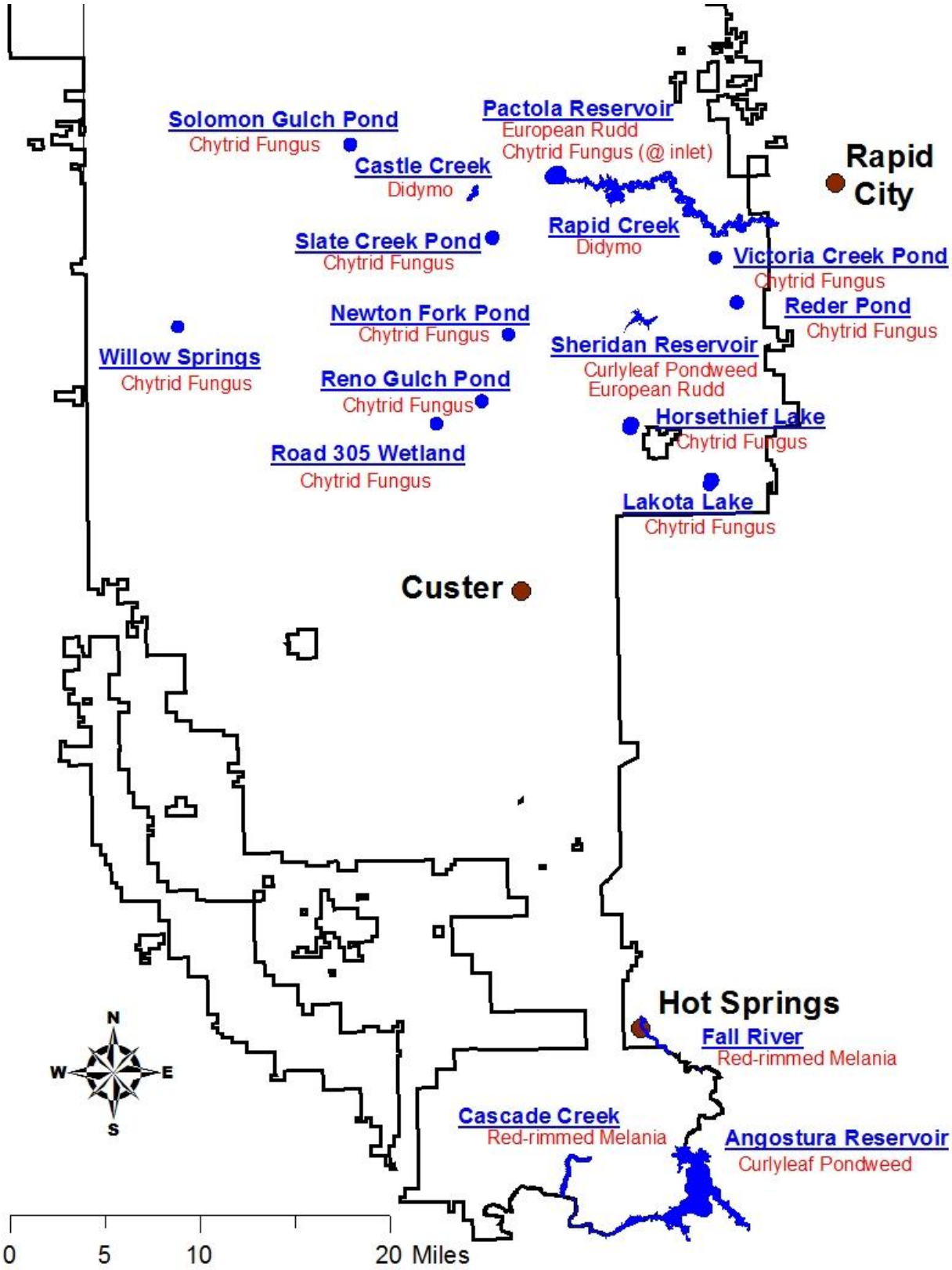

Figure 1. Waterbodies with aquatic nuisance species on the Black Hills National Forest.

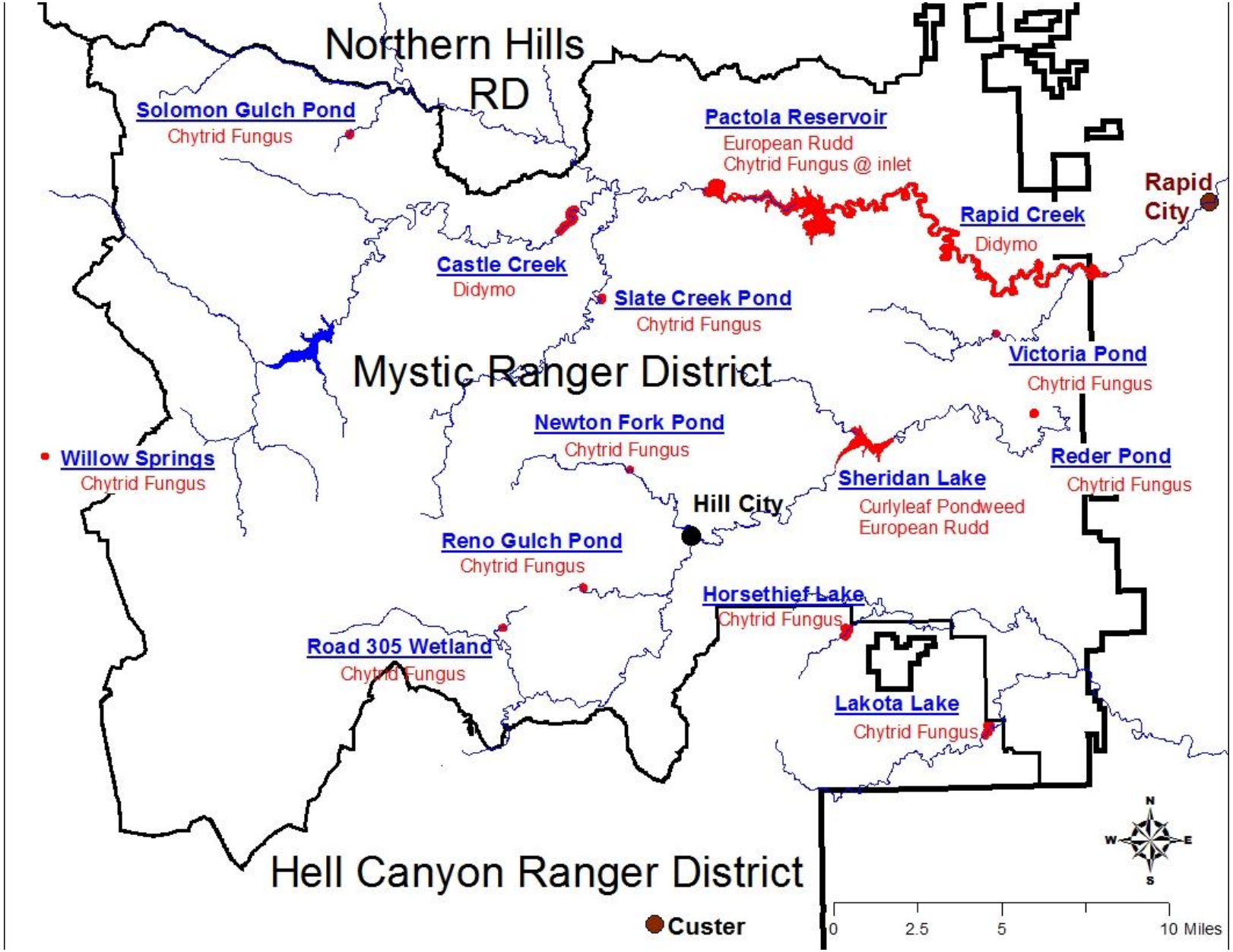

Figure 2. Waterbodies with aquatic nuisance species on the Central Black Hills.

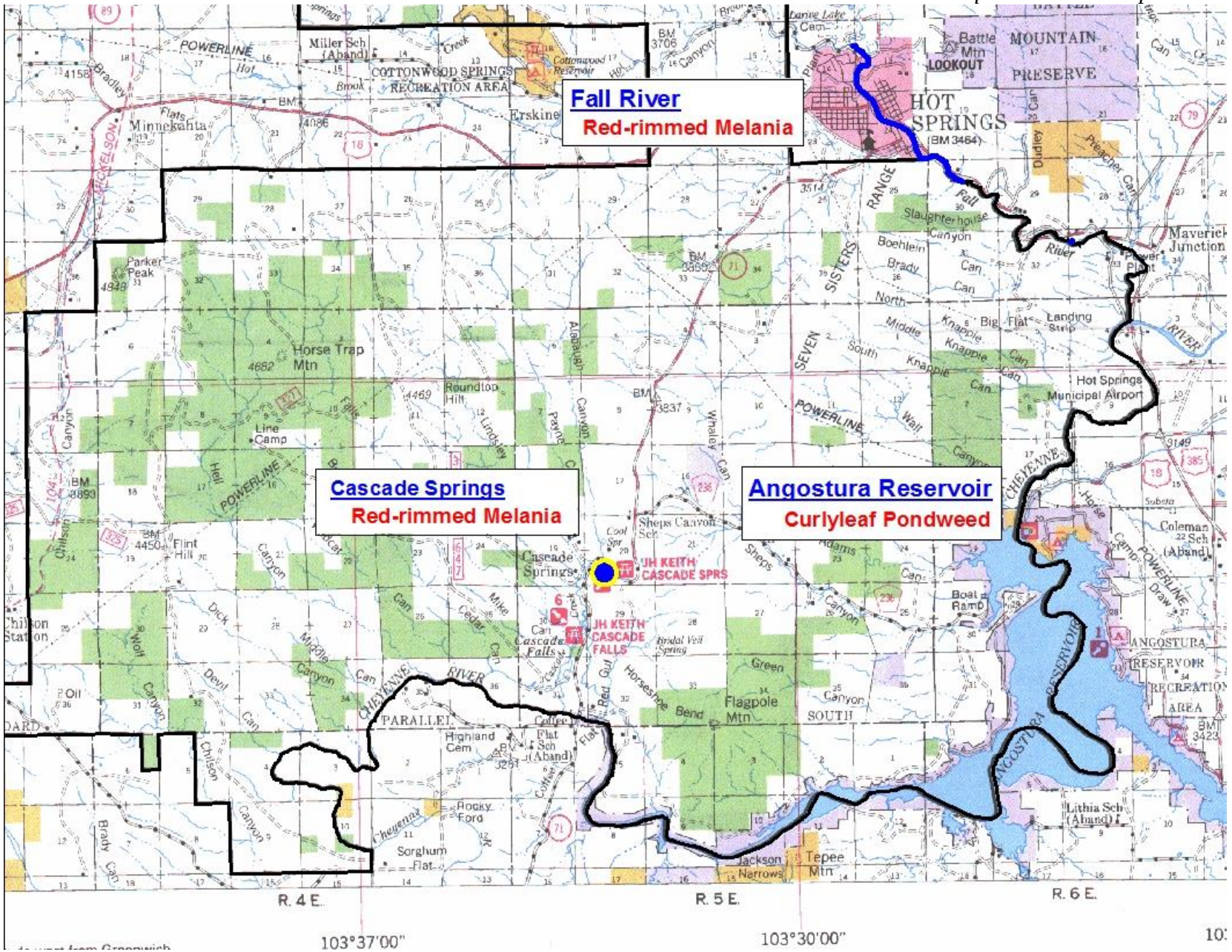

Figure 3. Waterbodies with aquatic nuisance species in the Southern Black Hills.

Aquatic Disinfectant Guidelines

These Forest Service guidelines are meant to be implemented by all resource specialists coming in contact with infected or potentially infected waters. SDGFP is currently developing an ANS disinfection procedure for boats and gear that may be an alternative in the future.

1. Before leaving the waters edge wash and remove all organic material.

Choose one of the following options for complete disinfection of water related equipment:

A. Completely dry all equipment for 4 to 5 days before re-use.

B. Spray all equipment with water >140°F water for a minimum of 10 minutes.

C. Store all equipment at temperatures below freezing for at least 24 hours.

D. Submerge equipment in a 7% bleach solution for 10 minutes. Rinse all equipment with tap water. Discard bleach solution in accordance with local and state laws. Most bleach solutions may be disposed of in municipal waste water drains. DO NOT discard into water bodies or storm drains. **7% bleach solution = 9 liquid oz. bleach per 1 gallon of water.**

E. Submerge equipment in a 4% quaternary ammonium compound (QAC) solution for a minimum of 15 minutes. After soaking rinse all equipment with tap water and discard solution in accordance with local and state laws. DO NOT discard into water bodies, storm drains or municipal waste water drains.

Disinfectant Name	% Active QAC (MSDS)	% QAC Conc. In Solution	ml per gal	Ounces per gal	QAC:H_2O
Sparquat 256 (discontinued)	*12.5*	*0.4*	*121.2*	*4.1*	*1:31*
Quat 4	10.0	0.4	153.8	5.2	1:25
Super HDQ Neutral	16.9	0.4	91.7	3.1	1:41
Green Solutions (GS) High Dilution Disinfectant 256	21.7	0.4	71	2.4	1:53
Vedco 128	8.45	0.4	180.4	6.1	1:21
Quat 128	8.45	0.4	180.4	6.1	1:21

F. Expose equipment for 10 – 15 minutes to 100% Formula 409 or 0.8% QAC solution (Schisler et al. 2008)

Aquatic Disinfectant Guidelines (Watercraft)

1. Before leaving the waters edge remove all organic material.
2. Before leaving the waters edge empty all standing water from watercraft.

Choose one of the following options for complete disinfection of watercraft:

A. Completely dry all equipment for 4 to 5 days before re-use.

B. Clean watercraft with a 7% Clorox® bleach solution. Use sponge or towel to completely clean all surfaces of the watercraft with the bleach solution.**** After cleaning rinse watercraft and towel or air dry. Most bleach solutions may be disposed of in municipal waste water drains. DO NOT discard into water bodies or storm drains. **7% bleach solution = 9 liquid oz. bleach per 1 gallon of water.**

C. Clean watercraft with a 0.8% quaternary ammonium compound (QAC) solution. Use sponge or towel to completely clean all surfaces of the watercraft with the sparquat solution.**** After cleaning rinse watercraft and towel or air dry. This solution is safe for municipal waste water drains. DO NOT discard into water bodies or storm drains.

Disinfectant Name	**% Active QAC (MSDS)**	**% QAC Conc. In Solution**	**ml per gal**	**Ounces per gal**	**QAC:H_2O**
Sparquat 256 (discontinued)	*12.5*	*0.8*	*242.4*	*8.2*	*1:16*
Quat 4	10.0	0.8	307.6	10.4	1:12
Super HDQ Neutral	16.9	0.8	183.4	6.2	1:21
Green Solutions (GS) High Dilution Disinfectant 256	21.7	0.8	142	4.8	1:27
Vedco 128	8.45	0.8	360.8	12.2	1:11
Quat 128	8.45	0.8	360.8	12.2	1:11

**** It generally takes 10 to 15 minutes of submersion in these solutions to be completely effective. It is not practical or possible to submerge watercraft in chemical solutions. The act of scrubbing boats with these chemicals will kill chytrid fungus and greatly reduce the chance of spreading any other aquatic nuisance and invasive species.

On-line Resources for ANS

General Information

Topic (source)	Link
Region 4 ANS program	http://www.fs.fed.us/r4/resources/aquatic/index.shtml
Lake Tahoe Basin Mgmt Unit program	http://www.fs.fed.us/r5/ltbmu/invasive-species/quagga.shtml
Region 9 ANS framework	http://www.fs.fed.us/r9/wildlife/nnis/documents/r9_nnis_framework.pdf
ANS (CO State Parks)	http://parks.state.co.us/NaturalResources/ParksResourceStewardship/AquaticNuisanceSpecies/
Invasive species program (USFS)	http://www.fs.fed.us/invasivespecies/
Aquatic nuisance species (NOAA)	http://www.research.noaa.gov/oceans/t_invasivespecies.html
Aquatic nuisance species (F&WS)	http://www.fws.gov/contaminants/ANS/ANSSpecies.cfm
Aquatic invasive species (USDA)	http://www.invasivespeciesinfo.gov/aquatics/main.shtml
Aquatic nuisance species (USGS)	http://nas.er.usgs.gov/
ANS, a Canadian perspective	http://www.invadingspecies.com/indexen.cfm
ANS Task Force	http://www.anstaskforce.gov/default.php
National Invasive Species Node	http://invasivespecies.nbii.gov/index.html
ANS experts database	http://www.anstaskforce.gov/experts/search.php

Education, Awareness, and Outreach

Topic (source)	Link
ANS prevention (Forest Service)	http://www.fs.fed.us/invasivespecies/documents/Aquatic_is_prevention.pdf
"Zap The Zebra" brochure	http://www.100thmeridian.org/ZTZ2007.asp
"Don't Move A Mussel" online video	http://wildlife.state.co.us/NewsMedia/Videos/Mussel.htm
Education, prevention, and BMPs	http://www.protectyourwaters.net/
Education and prevention	http://www.habitattitude.net/
Whirling disease education	http://fwp.mt.gov/fishing/etiquette/whrlpt01.html
Education	http://www.anstaskforce.gov/education.php
Educational materials	http://parks.state.co.us/NaturalResources/ParksResourceStewardship/AquaticNuisanceSpecies/EducationalMaterials
Communicating Effectively About Aquatic Nuisance Species, workshop	http://www.fishwildlife.org/science_ANSworkshop.html
Aquatic Invasive Species Education Handbook	http://www.uwex.edu/erc/pdf/AI/AquaticInvasivesHandbook.pdf
Education and outreach materials	http://www.clr.pdx.edu/projects/edoutreach/content/browse.php?table=title
Eurasian watermilfoil control	http://fwcb.cfans.umn.edu/research/milfoil/milfoilbc.html
Wildlife Forever threat campaign 2007	http://www.wildlifeforever.org/documents/WEB-THREATCAMPAIGN2007.pdf

Inventory and Monitoring

Topic (source)	Link
Monitoring recommendations for zebra mussels (100th Meridian)	http://www.100thmeridian.org/component4.htm
Monitoring protocols for ANS (USGS)	http://nas.er.usgs.gov/queries/protocols/protocollister.asp
Early detection and rapid response links (USDA)	http://www.invasivespeciesinfo.gov/aquatics/detection.shtml
Collecting water samples for veligers (100th Meridian)	http://www.100thmeridian.org/Documents/Dreissena%20Collection%20Protocol%20for%20PCR-USBR.pdf

Laws, Regulation, and Authorities

Topic (source)	Link
State of South Dakota	http://www.100thmeridian.org/Laws/StateInfo.asp?state=South%20Dakota
State of Wyoming	http://www.100thmeridian.org/Laws/StateInfo.asp?state=Wyoming
Federal laws and regulations	http://www.invasivespeciesinfo.gov/laws/federal.shtml
Executive Order 13112	http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=1999_register&docid=fr08fe99-168.pdf
Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990	http://www.anstaskforce.gov/Documents/nanpca90.pdf
CFR 261.58, Occupancy and Use of Areas Designated by Order	http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi

Species Specific Information

Topic (source)	Link
Chytrid fungus (Amphibian Ark)	http://www.amphibianark.org/chytrid.htm
Chytrid fungus (Bd maps)	http://www.bd-maps.net/
Didymo (EPA)	http://www.epa.gov/Region8/water/didymosphenia/
Didymo prevention (Quebec)	http://www.mddep.gouv.qc.ca/eau/eco_aqua/didymo/didymo-en.pdf
Eurasian watermilfoil (Washington)	http://www.ecy.wa.gov/Programs/wq/plants/weeds/milfoil.html
Eurasian watermilfoil (UMN)	http://fwcb.cfans.umn.edu/research/milfoil/milfoilbc/milfoil.html
New Zealand Mud Snail (PYW)	http://www.protectyourwaters.net/hitchhikers/mollusks_new_zealand_mudsnail.php
New Zealand Mud Snail (MSU)	http://www.esg.montana.edu/aim/mollusca/nzms/
Whirling Disease Initiative	http://whirlingdisease.montana.edu/
Whirling disease (Trout Unlimited)	http://www.tu.org/site/c.kkLRJ7MSKtH/b.3596607/
Whirling disease (PYW)	http://www.protectyourwaters.net/hitchhikers/others_whirling_disease.php
Whirling disease (CDOW)	http://wildlife.state.co.us/Research/Aquatic/WhirlingDisease/
Zebra mussels (CO State Parks)	http://parks.state.co.us/Zebra+Mussels.htm

Zebra and quagga (100th Meridian)	http://www.100thmeridian.org
Zebra and quagga control measures (Cornell EIS)	http://www.utilities.cornell.edu/utl_lsceis_mussels.html
Zebra and quagga FAQs (USGS)	http://fl.biology.usgs.gov/Nonindigenous_Species/Zebra_mussel_FAQs/Dreissena_FAQs/dreissena_faqs.html
Zebra and quagga infestation prevention and response planning guide	http://www.nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3875

State Resources

Topic	Link
South Dakota SD Department of Game, Fish and Parks ANS website	http://www.invasivespeciesinfo.gov/unitedstates/sd.shtml http://gfp.sd.gov/wildlife/nuisance/aquatic/default.aspx
Wyoming Wyoming Game and Fish Department	http://www.invasivespeciesinfo.gov/unitedstates/wy.shtml http://wgfd.wyo.gov/web2011/fishing-1000206.aspx